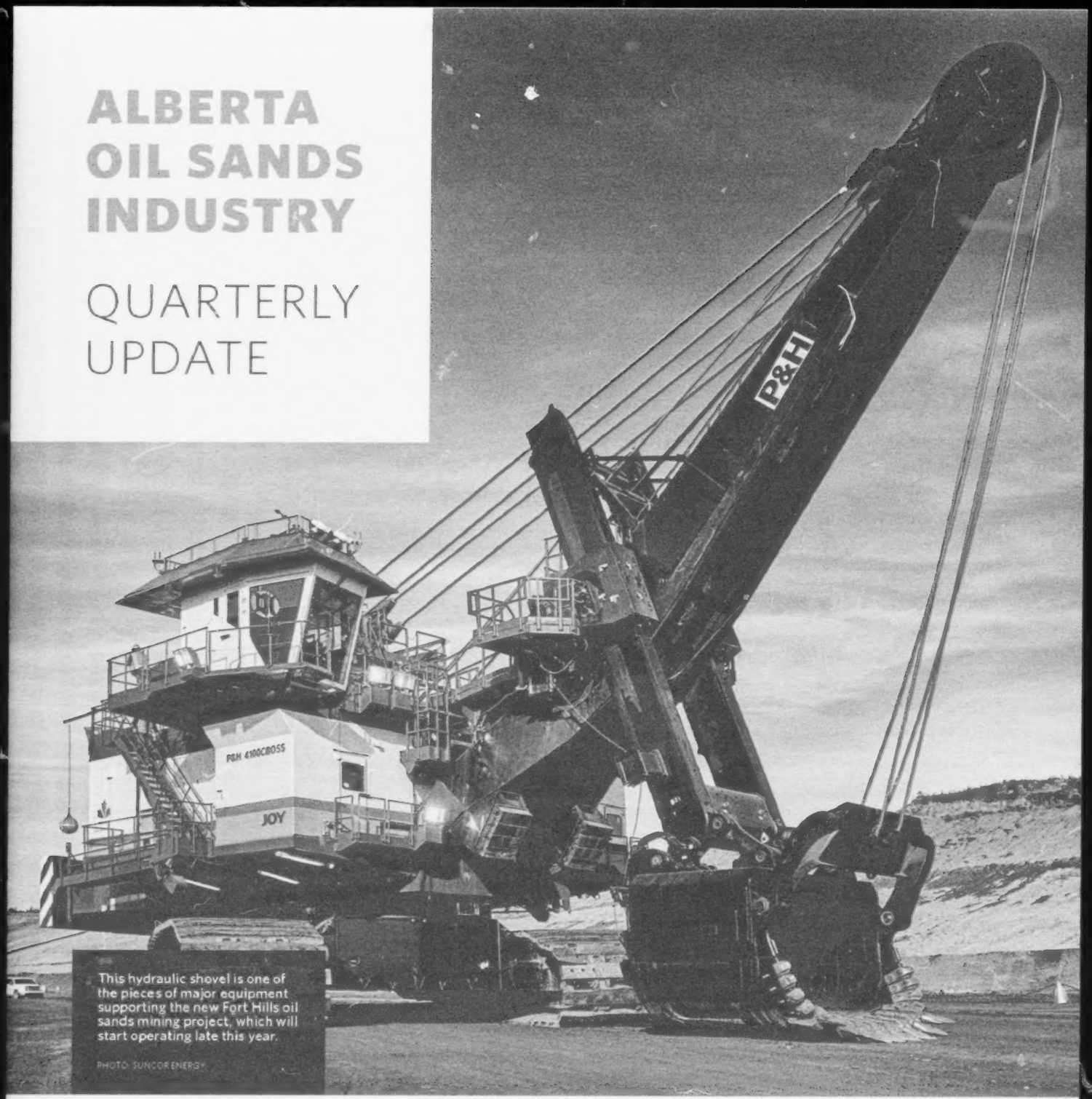
ALBERTA OIL SANDS INDUSTRY

QUARTERLY UPDATE



This hydraulic shovel is one of the pieces of major equipment supporting the new Fort Hills oil sands mining project, which will start operating late this year.

PHOTO: SUNCOR ENERGY

SUMMER 2017

Reporting period:
MARCH 21, 2016,
TO JUNE 6, 2017

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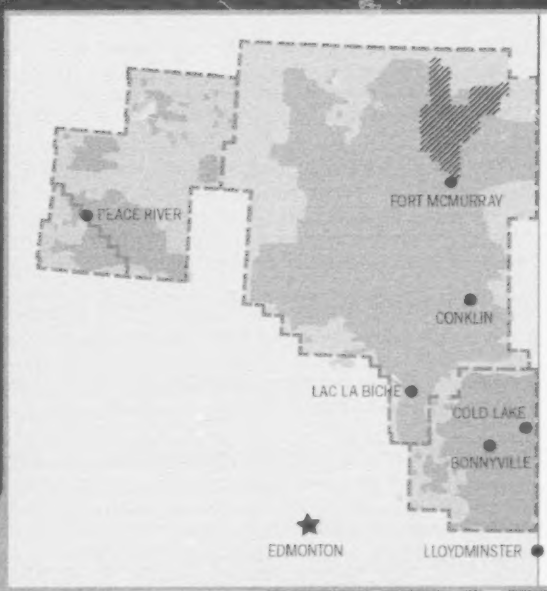
ALBERTA'S OIL SANDS

Canada's oil sands resources exist in three major deposits in Alberta: Athabasca, Cold Lake and Peace River. Athabasca, the largest in size and resource, is home to the surface mineable region. All other bitumen must be produced in situ or by drilling. Currently, the vast majority of oil sands production is exported to U.S. markets.



Initial volume in place
1.84 trillion barrels

Initial established reserves
176.8 billion barrels

Remaining established reserves (2016)
165.4 billion barrels

Cumulative production (2016)
11.4 billion barrels

Kitimat
Peace River
Fort McMurray
Grande Prairie
Edmonton
Burnaby
Hardisty
Anacortes
Calgary
Cromer
Clearbrook
Superior
Quebec City
Saint John
Montreal
Guernsey
Sarnia
Flanagan
Chicago
Patoka
Wood River
Cushing
Houston
Port Arthur
Freeport

Oil sands deposit
Peace River
Athabasca
Cold Lake
Surface mineable area
Oil sands area
Capital of Alberta
Pipeline
Proposed Pipeline

Canadian and U.S. crude oil pipelines and proposals

1. Enbridge Gateway
2. Kinder Morgan Trans Mountain
3. TransCanada Keystone
4. Spectra Express - Platte System
5. TransCanada Keystone XL
6. ENB Spearhead South
   ENB Flanagan South
7. ENB/Enterprise Seaway
8. TransCanada Gulf Coast Extension
9. Enbridge Mainline
10. TransCanada Energy East
11. Enbridge Line 9
12. Enbridge Southern Access

MARKET UPDATE

STRONGER CANADIAN PRODUCERS TAKE ON BIGGER STAKE OF THE OIL SANDS AS SOME INTERNATIONAL PLAYERS EXIT

As global oil majors appear to be stepping back from oil sands ownership positions, many are wondering how the sector will proceed with less foreign investment and whether Canadian companies can finance oil sands developments on their own.

"We're definitely seeing a shift in investment in the oil sands whereby a lot of the multinationals are divesting of their oil sands assets, and Canadian oil sands producers are taking increased positions in the oil sands," says Ben Brunnen, vice-president, oil sands with the Canadian Association of Petroleum Producers.

The late-March announcement that Cenovus Energy will spend $17.7 billion to take full ownership of SAGD assets from its former partner ConocoPhillips follows a number of recent major deals, including Canadian Natural's $12.7-billion acquisition of a majority stake in the Athabasca Oil Sands Project from Shell and Marathon and Statoil's sale of in situ assets to Athabasca Oil, valued up to $832 million.

Canadian companies appear to be doubling down in the oil sands as foreign multinationals pull away, Brunnen says. But while there is an economic shift, he believes there is continued financial interest in oil sands investments.

"The Canadian companies are raising their capital from the same types of markets as are the foreign companies, and so the capital is still interested because the oil sands generates returns. It's just these types of investment require a particular type of investor," he says.

"We're talking about upfront, significant capital costs, but not necessarily high sustaining costs. Over a long time period, there is a long-term payout. Each company is a bit different with its corporate strategy. In the Shell example, its corporate strategy is moving to a long position on gas."

THE IMPACT OF LESS CAPITAL AS A WHOLE

Fifteen years ago, the world thought it was running out of oil; however, technology has changed the oil dynamic from scarcity to apparent abundance, notes Kevin Birn, senior director of North American crude oil markets at IHS Markit.

While abundance may wane as conventional reserves decline and oil demand grows, for now companies are tilting portfolios and shifting asset bases to match changing investment perspectives. This impacts the oil sands.

"If you have fewer players in the field, then there may be less capital as a whole," Birn says.

"You may set yourself up for more modest periods of growth than in the past. I think the exiting of the majors is maybe more a confirmation of what people saw happening already."

Fortunately, he adds, Canadian producers are now of a scale where they can finance oil sands projects on their own.

"It was always a story dominated by Canada, and it will continue to be one. Those companies are now much, much bigger than they were in the past as well. It's a different dynamic. They are more capable of executing on projects than they were 10 or even five years ago. They are more capable of growing organically from their base and through their cash flow than they were in the past."

Following the recent major acquisitions by Canadian Natural Resources, Cenovus Energy and Suncor Energy, Canadian companies own approximately 80 per cent of oil sands production.

In 2014, IHS published a report showing that firms headquartered in Canada already controlled 55 per cent of oil sands production in 2012, and Canadian interests held 30 per cent of equity. As for foreign investment equity, the report showed 54 per cent came from U.S. citizens, while U.S.-based corporations accounted for 29 per cent of production at the time.

"We had the U.S. dominating, whereas Asia and Europe, in terms of equity, were under 10 per cent individually each. The oil sands is really a story of North American investment, but during the boom you did see companies like Statoil, Total and Shell additionally enter the oil sands specifically," Birn says.

JWN analysis shows that, following the recent deals, Canadian-headquartered companies will own about 80 per cent of oil sands production. ■

majorprojects.alberta.ca

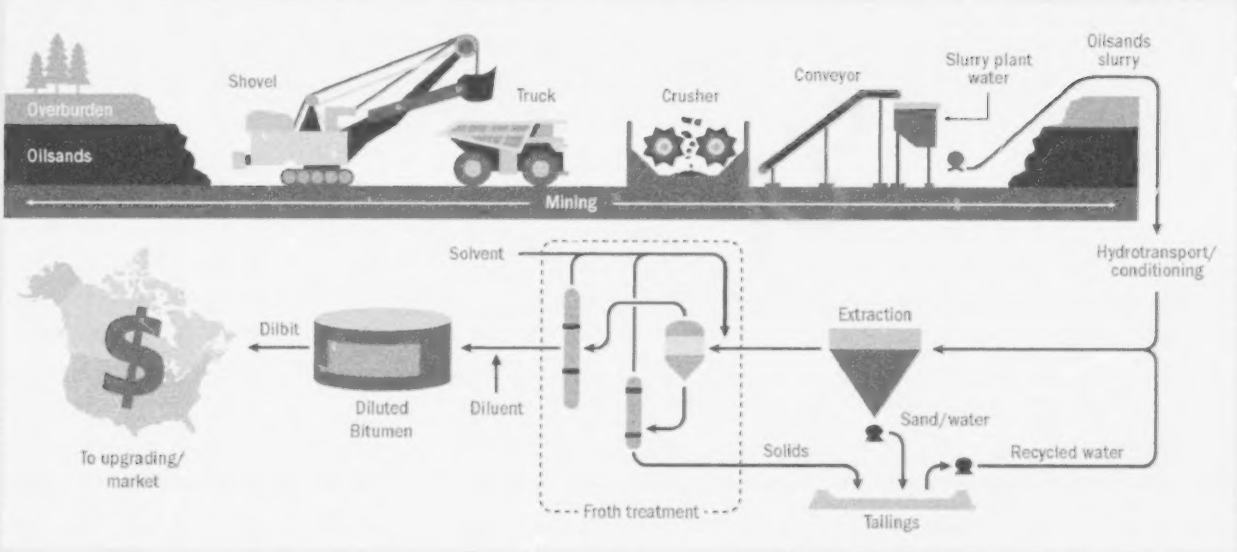
ALBERTA MAJOR PROJECTS

An inventory of private and public sector projects in Alberta valued at $5 million or greater

127 oil & gas, pipeline and industrial projects valued at $176.9B

Alberta Government

RESOURCE + TECHNOLOGY SPOTLIGHT



OIL SANDS MINING AND EXTRACTION

BACKGROUND

This year the oil sands industry marks 50 years of commercial operations, a major milestone based on the success of mining and extraction projects that began with the opening of the Great Canadian Oil Sands plant (now Suncor) in 1967.

Although smaller and scalable in situ, or drilled, oil sands production has increased dramatically in the last decade and now represents just over 50 per cent of total volumes, mining remains critically important to the oil sands industry.

HOW IT WORKS

After removal of forest and layers of overburden (muskeg and topsoil), oil sands ore is exposed. Hydraulic power shovels transfer the ore to heavy hauler trucks, which transport it to crushers where it is mixed with warm water and fed through a hydrotransport system to an extraction plant.

The mixture of oil, sand, and water is placed in separation vessels. Injected air forms tiny bubbles that separate bitumen from the sand and float it to the tank surface where it forms a thick froth that is skimmed off, mixed with naphtha and spun in a centrifuge to remove remaining solids, water and dissolved salts.

The cleaned sand and the water are then sent to the tailings area where the water is recycled back to the extraction process.

WHERE IT WORKS/ CURRENT STATUS

Commercially surface-mineable oil sands deposits span 4,800 square kilometres of the total 142,200 square kilometres of Alberta underlain by the resource.

The surface mineable region, where reserves are less than 75 metres underground and shallow enough to mine, is located north of Fort McMurray.

COMPANIES THAT USE SAGD

There are currently five oil sands mining and extraction operations: Suncor Base, Syncrude, the Horizon Project and Athabasca Oil Sands Project owned by Canadian Natural Resources, and Imperial Oil's Kearl facility. In late 2017, a sixth project, owned by Suncor at Fort Hills, will start operations.

THE FUTURE

Investment in new oil sands mining operations is not expected for many years following the start up of Fort Hills later in 2017. However, as the first project marks its milestone 50 years of operations with no shut down plan in sight, the continued longevity of these assets and the long-term benefit of their operations both to corporations, suppliers and communities is clear.

According to the most recent forecast from the Canadian Association of Petroleum Producers, by 2030 mining production will grow to 1.5 million bbls/d, up from 1.1 million bbls/d in 2017. This compares to an in situ production increase from 1.4 million bbls/d to 2.1 million bbls/d during the same period. ■

WHAT'S NEW
PROJECTS

Sunshine Oilsands is preparing to double production capacity at its West Ells SAGD project at the surprisingly low capital cost of $50 million, but it's because the expansion is already nearly finished.

West Ells Phase 1, which has production capacity of 5,000 bbls/d, was completed in late 2015 and achieved production of 3,800 bbls/d in the first quarter of 2017 as Sunshine accelerated ramp up to capitalize on higher prices.

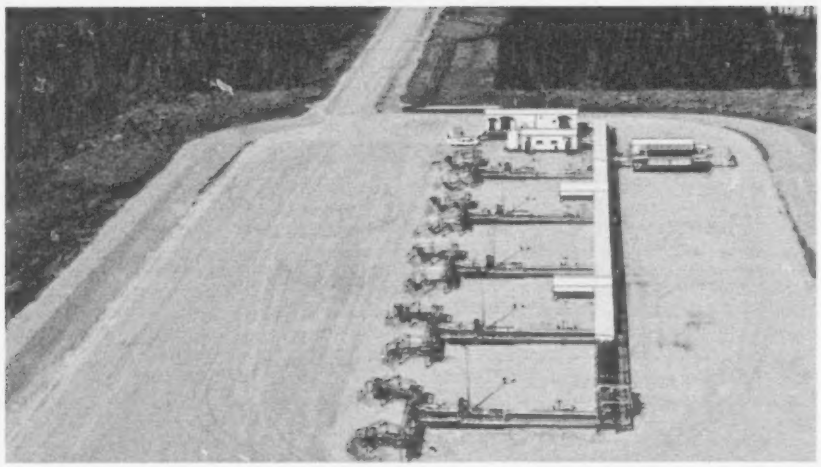
Sunshine recently announced it signed an MOU with China Petroleum Engineering & Construction Corporation to explore investing $50 million to double West Ells capacity to 10,000 bbls/d. The relatively low cost is because the main surface facilities already exist and all eight SAGD wells have already been drilled.

Osum Oil Sands is planning to increase production and improve efficiency at its Orion SAGD project without proceeding with a full project expansion, instead by drilling eight new SAGD well pairs on existing well pads and adding central processing facility infrastructure including a third evaporator for water treatment.

The junior company, which purchased Orion from Shell for $325 million in 2014, has regulatory approval to expand capacity from the current 10,000 bbls/d to 20,000 bbls/d. The project currently averages about 8,000 bbls/d, but Osum plans to increase that to 13,500 bbls/d.

Osum plans to start working on the project by November 2017, with commissioning and first steam by mid-2018. A schedule is contingent on receiving regulatory approval by September of this year.

Construction on Fort Hills has now surpassed 83 per cent completion, 20 per cent owner Teck reported with its first-quarter results.



Four of the six major project areas (mining, ore preparation plant, infrastructure and primary extraction) have been turned over to operations, the company says. Over 60 per cent of operations personnel have been hired, and the remaining construction focus is on utilities and secondary extraction.

First oil continues to be expected by the end of the year.

As Canadian Natural Resources nears completion of its 80,000-bbl/d Stage 3 expansion at its Horizon project, the company is also proceeding with a major Horizon upgrader debottleneck project this year that will add additional production capacity of up to 15,000 bbls/d.

The project reached record levels of production in the first quarter, with synthetic crude oil production averaging 192,491 bbls/d compared to capacity of 167,000 bbls/d.

Japan Canada Oil Sands (JACOS) has initiated steam injection at the 20,000-bbl/d Hangingstone SAGD project, an expansion of the 8,000-bbl/d pilot project the company has been operating south of Fort McMurray since 1999.

Operations at the original project are temporarily suspended due to market conditions, but JACOS applied earlier this year to "act quickly" to restart as economics have improved. Production is expected to start around the middle of the year, ramping up to full capacity by mid-2018.

Two years after finishing construction of the 10,000-bbl/d BlackGold SAGD project, Harvest Operations Corp. has indicated it is getting ready to commence operations.

The company says that the central processing facility was substantially completed in early 2015, but completion of sanctioning and commissioning activities was subsequently postponed due to the bitumen price environment.

Harvest spokesman Greg Foofat says the company is now going to complete some of the project's systems for evaluation, work on minor equipment such as insulation and heat tracing, and potentially look to steam in 2018 depending on that pace of work.

Basically the company is setting itself up to move quickly once it is comfortable moving ahead with steam injection and production.

"This way we can turn on the switch when we want to turn it on," he said.

WHAT'S NEW
BUSINESS

Cenovus Energy is buying out its long-time SAGD partner ConocoPhillips in a $17.7-billion deal that will see another non-Canadian player give up large chunks of operating oil sands assets.

While ConocoPhillips will retain its 50 per cent ownership and operatorship of the Surmont SAGD project, it is selling its 50 per cent interest in the Foster Creek/Christina Lake (FCCL) joint venture to Cenovus.

The deal also gives Cenovus a large, under-utilized chunk of ConocoPhillips' conventional assets in the Deep Basin.

Cenovus will divest of a number of properties to support the deal, including conventional assets at Suffield and heavy oil operations at Pelican. The company also confirmed that it may sell non-producing oil sands asset.

GMP FirstEnergy had previously speculated that Cenovus may have been looking to divest either of its Telephone Lake or Steepbank/East McMurray undeveloped in situ oil sands assets east of Fort McMurray, and that it is likely that Imperial/Exxon would be an interested bidder.

On June 1, 2017, Canadian Natural Resources took over as the operator and majority owner of the Athabasca Oil Sands Project, increasing its production to over one million boe/d.

On June 1, 2017, Canadian Natural Resources took over as operator and majority owner of the Athabasca Oil Sands Project (AOSP), which Shell commissioned in 2002, as well as everything else upstream Shell operated in the oil sands.

The company announced the $12.74-billion package of deals in March, centrepieced by its acquisition of a 70 per cent stake in the AOSP including the Scotford Upgrader and Quest carbon capture and storage project. Shell retains operatorship of the Scotford Upgrader with its remaining 10 per cent stake, which is part of Shell's wider Scotford Refinery complex near Edmonton.

The close of the deals also immediately adds production volumes to Canadian Natural, expected in June to be up to 191,000 bbls/d from the AOSP and up to 14,000 bbls/d from thermal properties at Peace River.

After several months of testing specially designed high-manganese steel pipe for oil sands slurry transport at its Kearl mining project, Exxon Mobil has contracted with South Korea's largest steelmaker, Posco, for mass production of the pipe.

Developed by the two companies over the past five years, the high-manganese steel pipe is highly abrasion resistant, with tests showing at least five times more wear resistance than conventional steel pipes, and provides high-impact strength for transporting the abrasive product.

Edmonton heavy haul and mining contractor North American Energy Partners is investing in a Janvier, Alta.-based private First Nations business, Dene Sky Site Services, in an effort to expand its oil sands service presence at a "modest" cost.

Through subsidiary North American Enterprises, the company has entered into a 49 per cent partnership agreement with Dene Sky, which provides earthworks, road construction and maintenance, specialized welding, site development, plant maintenance and labour services.

Suncor Energy reported in early May that pipeline shipments have restarted from Syncrude following a fire at the project's upgrader on March 14.

"Shipments are currently at approximately 140,000 bbls/d [gross] and are expected to ramp up as additional units complete turnaround activities," Suncor said in a statement.

Syncrude has synthetic crude production capacity of 350,000 bbls/d. Lead owner Suncor said that production is expected to return to full rates in June.

BlackPearl Resources is focusing its capital on thermal heavy oil development in Saskatchewan as the company waits for investment interest to return to the oil sands, chief executive officer John Festival says.

BlackPearl has been operating its successful Blackrod SAGD pilot in the south Athabasca oil sands region since 2012 and last year received regulatory approval for a commercial 80,000-bbl/d project, but the junior company is seeking a joint venture partner.

Currently, that partner is hard to find, but Festival is confident that prices will rise and that BlackPearl will subsequently be able to find joint venture support.

Currently, BlackPearl is constructing the 6,000-bbl/d second phase of its Onion Lake thermal project, which targets conventional heavy oil in Saskatchewan.

WHAT'S NEW
ENVIRONMENT + TECHNOLOGY

MEG Energy is seeking to expand its field trial of a new propane-based in situ oil sands technology, called enhanced modified vapour extraction (eMVAPEX), just five months after the start of pilot operations.

MEG has been operating an eMVAPEX pilot, comprised of one well pair and two infill wells, at its Christina Lake SAGD project since November 2016. The process incorporates a start-up steam injection mode to raise reservoir temperature to the point where bitumen is mobilized.

The company is now seeking regulatory approval to expand the pilot with two additional well pairs and two additional infill wells.

The expansion would operate for two years, after which the decision to continue or terminate propane injection will be made.

MEG has asked the Alberta Energy Regulator for operational confidentiality during that period.

Meanwhile, MEG says that its enhanced modified steam and gas push (eMSAGP) technology, which employs infill wells and non-condensable gas co-injection and has been rolled out commercially at Christina Lake, is delivering industry-leading results.

EMSAGP has increased MEG's production above the project's nameplate capacity, to 77,245 bbls/d in the first quarter of 2017 against nameplate of 60,000 bbls/d.

By co-injecting non-condensable gas, steam can be "redeployed," enabling additional wells to go into production. It is also reducing SORs.

Data from the *Daily Oil Bulletin* shows that in the first quarter of 2017 MEG's Christina Lake project had an average SOR of 2.4:1, but in areas where eMSAGP has been deployed, the figure is "an industry-leading range of 1.0 to 1.25," says MEG's chief executive officer Bill McCaffrey.

A three-day field test of a radio frequency in situ oil sands technology, RF XL, has successfully met its objectives, allowing for plans to progress on a second-phase commercial-scale pilot, Acceleware says.

Acceleware's second phase of testing is planned for 2017 and 2018. The technology is estimated to be three years away from commercialization pending some form of government funding.

University of Calgary scientist Zhangxing (John) Chen says virtual reality is key to improving oil and gas efficiencies while also testing new extraction theories in real-time without the expense, environmental impact and potential frustration of experimenting in the field.

Chen's team is working with companies such as Nexen, Suncor and Husky within the consortium to test new heavy oil and bitumen recovery processes using mathematical models based on real field data. Some of this work focuses on optimizing solvent-assisted SAGD processes, using physics-based simulations to model critical issues such as how much solvent to inject and when.

Suncor Energy is currently operating a test fleet of autonomous haulers at its base oil sands mining project and has been testing the technology since 2015.

Suncor has said it may proceed with progressive implementation of autonomous hauling system technology this year, which is also the timing for the start-up of the new Fort Hills mining facility, though no decision has been made about using autonomous hauling at that project yet.

In its *2016 Sustainability Report*, Shell says its direct total greenhouse gases (GHGs) were 70 million tonnes of CO_2 equivalent in 2016, down from 72 million tonnes in 2015 and 76 million tonnes in 2014. The 2016 figure is the lowest for the company since 2009.

The company attributes its declining global GHG emissions partly to the Quest carbon capture and storage (CCS) project at the Scotford Upgrader near Edmonton, which is the only CCS project to capture volumes from oil sands production. Shell also says that overall reduced flaring levels, divestments (such as in Nigeria and the U.K.) and operational improvements across many facilities contributed to its lower GHGs in 2016.

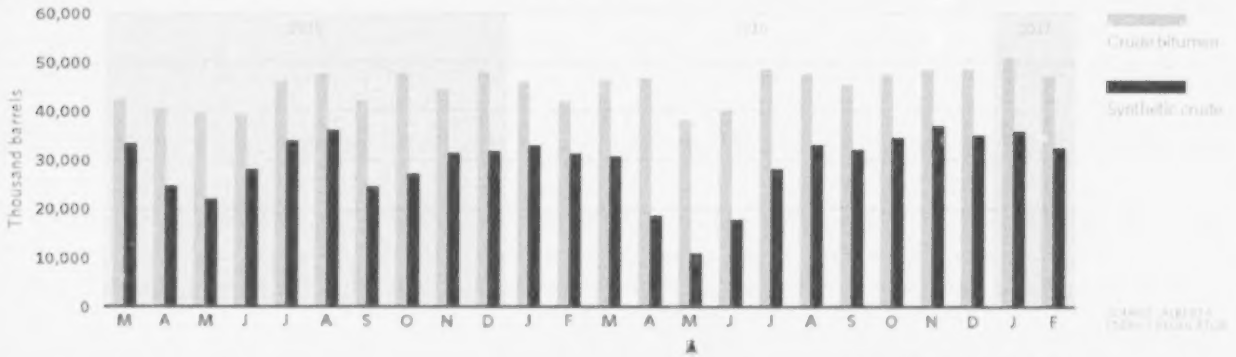
Suncor Energy has applied to expand solvent-assisted SAGD technology on "as close to a commercial scale as possible."

Suncor applied to the AER in April to apply expanding solvent SAGD (ES-SAGD) on up to seven injection wells on one pad at its Firebag SAGD project. The technology demonstration would have up to three stages of development in order to assess its success.

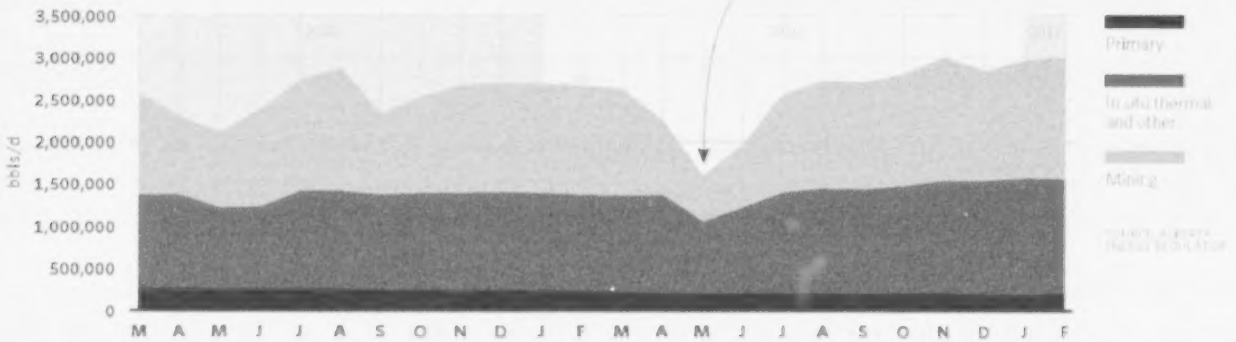
If approved, the scheduled start-up date is in Q2/2018 and the demonstration is expected to run for up to two years.

OIL SANDS DATA

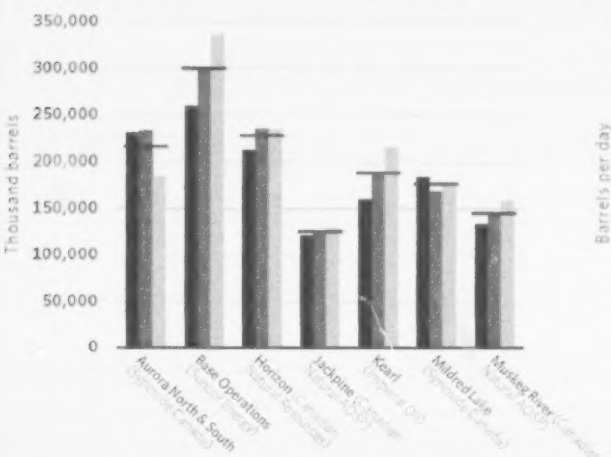
ALBERTA CRUDE BITUMEN AND SYNTHETIC CRUDE PRODUCTION



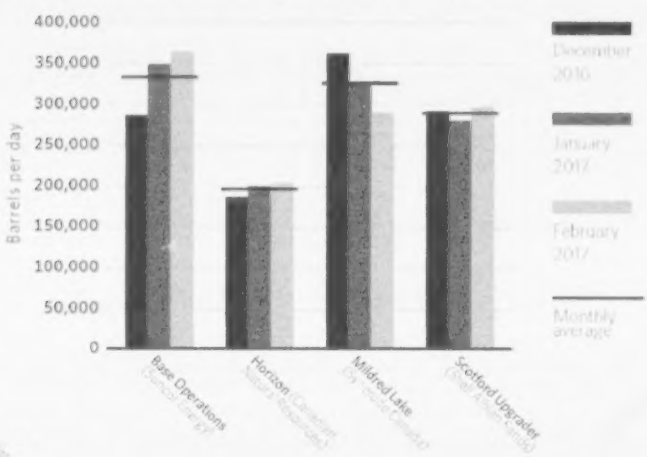
ALBERTA BITUMEN PRODUCTION BY EXTRACTION TYPE



OIL SANDS MINING PRODUCTION BY PROJECT



OIL SANDS UPGRADER PRODUCTION BY PROJECT



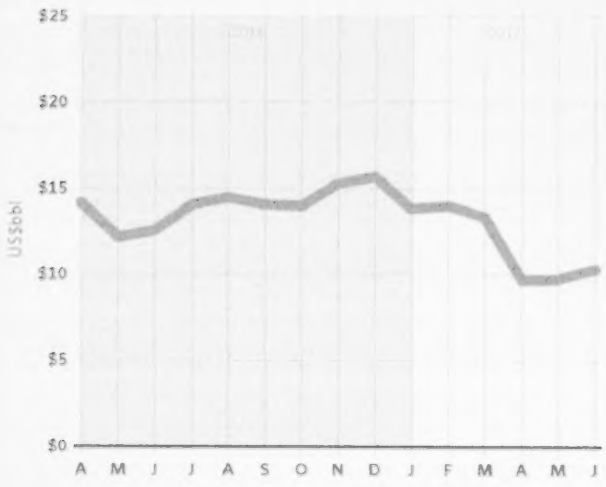
THERMAL OIL SANDS PRODUCTION BY PROJECT
JAN. 2017 - MAR. 2017

(Barrels per day)

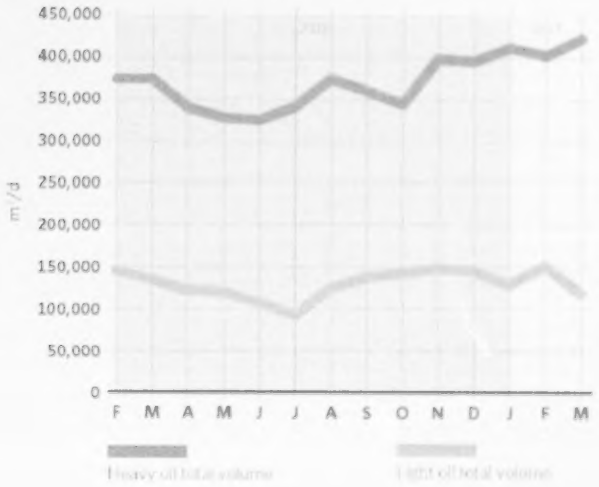
COMMERCIAL SCHEMES					
COMPANY	FIELD	JAN	FEB	MAR	MONTHLY AVERAGE
Suncor Energy Inc.	Firebag	201,780.9	203,298.0	203,015.6	202,698.2
Cenovus Energy Inc.	Christina Lake	193,409.2	197,974.6	212,932.1	201,472.0
Cenovus Energy Inc.	Foster Creek	165,080.5	160,627.9	158,748.5	161,485.7
Imperial Oil Limited	Cold Lake	160,007.1	149,539.6	155,707.4	155,083.0
Devon Canada Corporation	Jackfish	125,505.0	128,275.3	127,753.0	127,161.1
ConocoPhillips Canada Limited	Surmont	110,433.4	114,906.7	95,227.1	106,855.7
Canadian Natural Resources Limited	Primrose & Wolf Lake	90,740.9	91,446.9	81,531.0	87,906.0
MEG Energy Corp.	Christina Lake	77,404.3	71,266.1	77,849.6	75,506.7
CNOOC Limited	Long Lake	40,897.6	37,347.0	36,141.3	38,128.6
Canadian Natural Resources Limited	Kirby South	38,462.8	37,726.9	35,918.0	37,369.2
Husky Energy Inc.	Sunrise	34,801.5	36,174.6	36,228.7	35,734.9
Suncor Energy Inc.	MacKay River	35,293.4	35,639.3	35,821.1	35,584.6
Husky Energy Inc.	Tucker	22,036.4	21,240.1	23,333.3	22,203.2
Athabasca Oil Corporation	Leismer Demonstration	21,373.4	22,598.0	22,456.5	22,142.6
Pengrowth Energy Corporation	Lindbergh Pilot	14,590.5	15,503.1	14,290.5	14,794.7
Connacher Oil and Gas Limited	Great Divide	11,929.3	12,142.5	12,073.3	12,048.3
Athabasca Oil Corporation	Hangingstone	7,600.6	8,911.4	9,083.7	8,531.9
Osum Oil Sands Corp.	Orion	7,661.0	7,762.9	7,548.4	7,657.4
Canadian Natural Resources Limited	Peace River/Carmon Creek	5,299.8	5,423.1	5,103.6	5,275.5
Sunshine Oilsands Ltd.	West Ells	1,439.1	1,503.9	1,796.4	1,579.8
BlackPearl Resources Inc.	Blackrod	555.4	544.7	533.4	544.5
Petro-Canada	Harmon Valley South Pilot	55.4			55.4
Brion Energy Corporation	MacKay River		57.2	52.2	54.7
Shell Canada Limited	Peace River		11.3	22.6	17.0
Total Commercial		**1,366,356.3**	**1,359,821.2**	**1,353,162.2**	**1,359,779.9**

CRUDE OIL PRICE DIFFERENTIAL (WTI-WCS)

Recorded until June 6, 2017

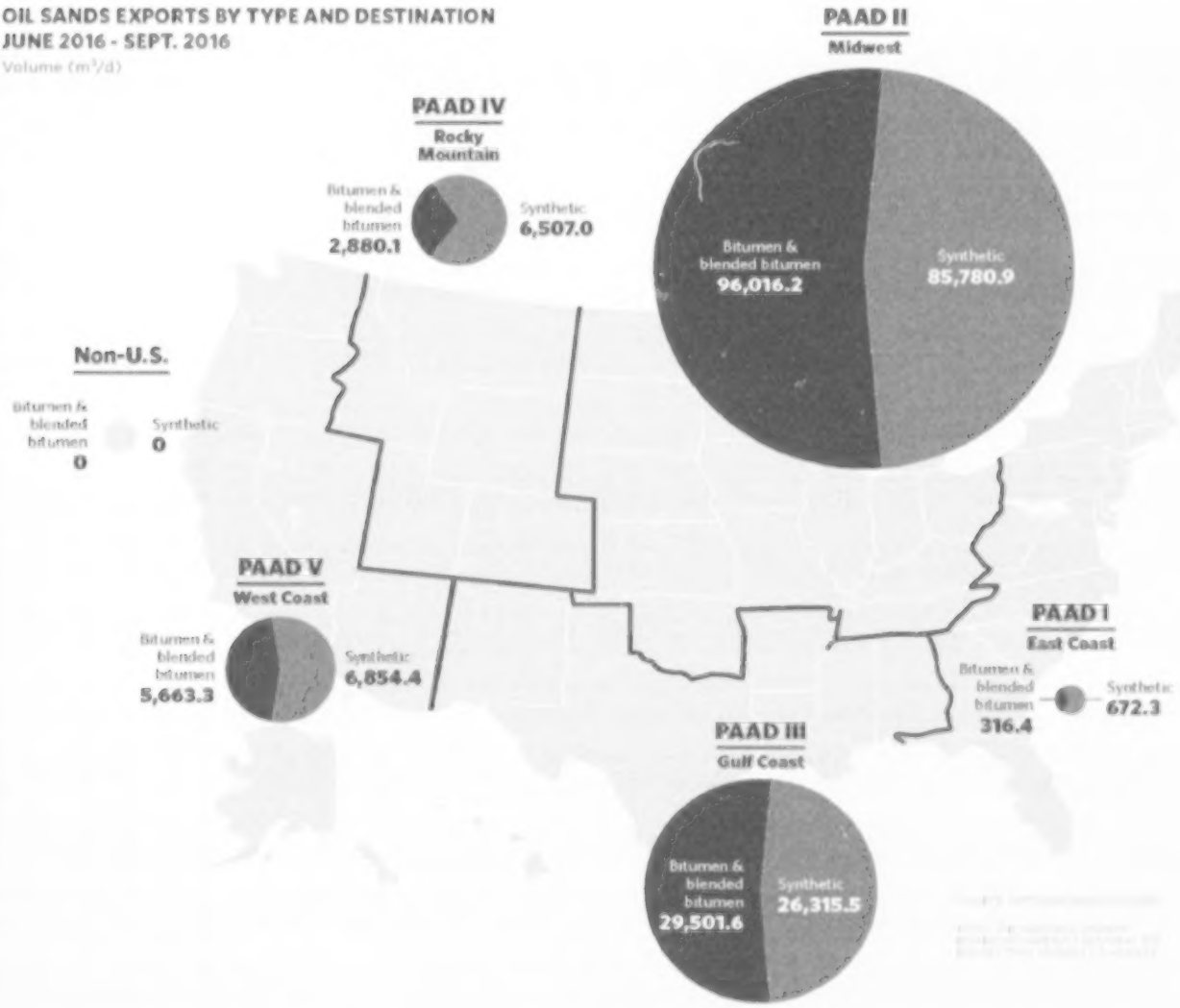


CANADIAN CRUDE OIL EXPORTS

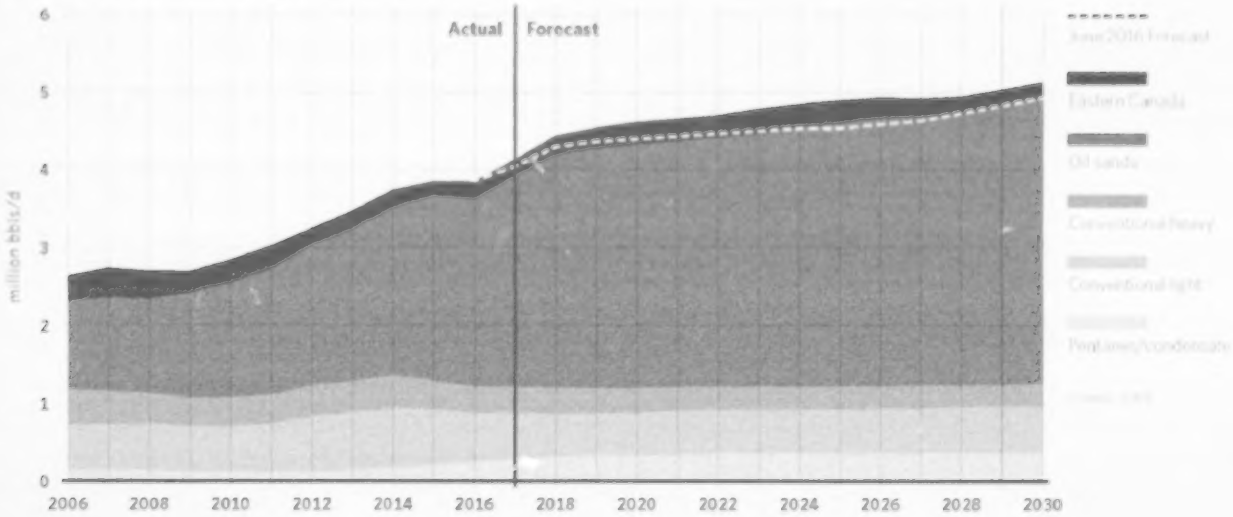


OIL SANDS EXPORTS BY TYPE AND DESTINATION
JUNE 2016 - SEPT. 2016

Volume (m^3/d)



CANADIAN OIL SANDS & CONVENTIONAL PRODUCTION



GLOSSARY OF OIL SANDS TERMS

A

ASPHALTENES

The heaviest and most concentrated aromatic hydrocarbon fractions of bitumen.

B

BARREL

The traditional measurement for crude oil volumes. One barrel equals 42 U.S. gallons or 159 litres. There are 6.29 barrels in one cubic metre of oil.

BITUMEN

Naturally occurring, viscous mixture of hydrocarbons that contains high levels of sulphur and nitrogen compounds. In its natural state, it is not recoverable at a commercial rate through a well because it is too thick to flow. Bitumen typically makes up about 10 per cent by weight of oil sand, but saturation varies.

C

COGENERATION

The simultaneous production of electricity and steam, which is part of the operations of many oil sands projects.

COKING

An upgrading/refining process used to convert the heaviest fraction of bitumen into lighter hydrocarbons by rejecting carbon as coke. Coking can be either delayed coking (semi-batch) or fluid coking (continuous).

CONDENSATE

Mixture of extremely light hydrocarbons recoverable from gas reservoirs. Condensate is also referred to as a natural gas liquid and is used as a diluent to reduce bitumen viscosity for pipeline transportation.

CONVENTIONAL CRUDE OIL

Mixture of mainly pentane and heavier hydrocarbons recoverable at a well from an underground reservoir and liquid at atmospheric pressure and temperature. Unlike bitumen, it flows through a well without stimulation and through a pipeline without processing or dilution.

CRACKING

An upgrading/refining process for converting large, heavy molecules into smaller ones. Cracking processes include fluid cracking and hydrocracking.

CYCLIC STEAM STIMULATION (CSS)

An in situ production method incorporating cycles of steam injection, steam soaking and oil production. The steam reduces the viscosity of the bitumen and allows it to flow to the production well.

D

DENSITY

The heaviness of crude oil, indicating the proportion of large, carbon-rich molecules, generally measured in kilograms per cubic metre (kg/m^3) or degrees on the American Petroleum Institute (API) gravity scale. In western Canada, oil up to 900 kg/m^3 is considered light-to-medium crude; oil above this density is deemed as heavy oil or bitumen.

DILBIT

Bitumen that has been reduced in viscosity through the addition of a diluent such as condensate or naphtha.

DILUENT

A light hydrocarbon blended with bitumen to enable pipeline transport. See Condensate.

E

EXTRACTION

A process unique to the oil sands industry that separates the bitumen from the oil sand using hot water, steam and caustic soda.

F

FROTH TREATMENT

The means to recover bitumen from the mixture of water, bitumen and solids "froth" produced in hot-water extraction (in mining-based recovery).

G

GASIFICATION

A process to partially oxidize any hydrocarbon, typically heavy residues, to a mixture of hydrogen and carbon monoxide. Can be used to produce hydrogen and various energy by-products.

GROUNDWATER

Water accumulations below the Earth's surface that supply fresh water to wells and springs.

H

HEAVY CRUDE OIL

Oil with a gravity below 22 degrees API. Heavy crudes must be blended or mixed with condensate to be shippe by pipeline.

HYDROCRACKING

Refining process for reducing heavy hydrocarbons into lighter fractions using hydrogen and a catalyst; can also be used in upgrading bitumen.

HYDROTRANSPORT

A slurry process that transports water and oil sand through a pipeline to primary separation vessels located in an extraction plant.

HYDROTREATER

An upgrading/refining process unit that reduces sulphur and nitrogen levels in crude oil fractions by catalytic addition of hydrogen.

I

IN SITU

A Latin phrase meaning "in its original place." In situ recovery refers to various drilling-based methods used to recover deeply buried bitumen deposits.

IN SITU COMBUSTION

An enhanced oil recovery method that works by generating combustion gases (primarily CO and CO_2) downhole, which then push the oil toward the recovery well.

L

LEASE

A legal document from the province of Alberta giving an operator the right to extract bitumen from the oil sand existing within the specified lease area. The land must be reclaimed and returned to the Crown at the end of operations.

LIGHT CRUDE OIL

Liquid petroleum with a gravity of 28 degrees API or higher. A high-quality light crude oil might have a gravity of about 40 degrees API. Upgraded crude oils from the oil sands run around 30–33 degrees API (compared to 32–34 for Light Arab and 37–40 for West Texas Intermediate).

M

MATURE FINE TAILINGS

A gel-like material resulting from the processing of clay fines contained within the oil sands.

O

OIL SANDS

Bitumen-soaked sand deposits located in three geographic regions of Alberta: Athabasca, Cold Lake and Peace River. The Athabasca deposit is the largest, encompassing more than 42,340 square kilometres. Total in-place deposits of bitumen in Alberta are estimated at 1.7 trillion to 2.5 trillion barrels.

OVERBURDEN

A layer of sand, gravel and shale between the surface and the underlying oil sand in the mineable oil sands region that must be removed before oil sands can be mined.

P

PERMEABILITY

The capacity of a substance, such as rock, to transmit a fluid, such as crude oil, natural gas or water. The degree of permeability depends on the number, size and shape of the pores and/or fractures in the rock and their interconnections. It is measured by the time it takes a fluid of standard viscosity to move a given distance. The unit of permeability is the Darcy.

PETROLEUM COKE

Solid, black hydrocarbon that is left as a residue after the more valuable hydrocarbons have been removed from the bitumen by heating the bitumen to high temperatures.

PRIMARY PRODUCTION

An in situ recovery method that uses natural reservoir energy (such as gas drive, water drive and gravity drainage) to displace hydrocarbons from the reservoir into the wellbore and up to the surface. Primary production uses an artificial lift system in order to reduce the bottomhole pressure or increase the differential pressure to sustain hydrocarbon recovery, since reservoir pressure decreases with production.

R

RECLAMATION

Returning disturbed land to a stable, biologically productive state. Reclaimed property is returned to the province of Alberta at the end of operations.

S

STEAM ASSISTED GRAVITY DRAINAGE (SAGD)

An in situ production process using two closely spaced horizontal wells: one for steam injection and the other for production of the bitumen/water emulsion.

SURFACE MINING

Operations to recover oil sands by open-pit mining using trucks and shovels. Less than 20 per cent of Alberta's oil sands resources are located close enough to the surface (within 75 metres) for mining to be economic.

SYNTHETIC CRUDE OIL

A manufactured crude oil comprised of naphtha, distillate and gas oil-boiling range material. Can range from high-quality, light, sweet bottomless crude to heavy, sour blends.

T

TAILINGS

A combination of water, sand, silt and fine clay particles that is a byproduct of removing the bitumen from the oil sand through the extraction process.

TAILINGS SETTLING BASIN

The primary purpose of the tailings settling basin is to serve as a process vessel, allowing time for tailings water to clarify and silt and clay particles to settle so that the water can be reused in extraction. The settling basin also acts as a thickener, preparing mature fine tails for final reclamation.

THERMAL RECOVERY

Any in situ process where heat energy (generally steam) is used to reduce the viscosity of bitumen to facilitate recovery.

U

UPGRADING

The process of converting heavy oil or bitumen into synthetic crude either through the removal of carbon (coking) or the addition of hydrogen (hydroconversion).

V

VISCOSITY

The ability of a liquid to flow. The lower the viscosity, the more easily the liquid will flow.

Alberta

Capital Investment Tax Credit (CITC)

Are you an Alberta-based business conducting manufacturing, processing or tourism infrastructure activities? Are you looking to make an investment of at least $1 million in value?

If so, you can apply for a 10 per cent tax credit on eligible capital expenditures, up to a maximum of $5 million.

For more information on how and when to apply for the CITC, visit: jobsplan.alberta.ca or email **citc.program@gov.ab.ca**

We listened to business leaders' ideas to create the Alberta Jobs Plan. This included implementing new tax credits, providing training for aspiring entrepreneurs, adding supports for established ones, increasing access to capital and cutting the small business tax.

Together, we are creating new jobs, diversifying Alberta's economy and making the lives of Albertans better.

OIL SANDS CONTACTS

OIL SANDS PRODUCERS

Athabasca Oil www.atha.com
Baytex Energy www.baytex.ab.ca
BlackPearl Resources www.blackpearlresources.ca
Brion Energy www.brionenergy.com
Canadian Natural Resources www.cnrl.com
Cenovus Energy www.cenovus.com
Chevron Canada www.chevron.ca
CNOOC www.cnoocltd.com
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Enerplus Resources Fund www.enerplus.com
E-T Energy www.e-tenergy.com
Grizzly Oil Sands ww...rizzlyoilsands.com
Harvest Operations www.ha...tenergy.ca
Husky Energy www.huskyenergy.ca
Imperial Oil www.imperialoil.ca
Japan Canada Oil Sands www.jacos.com
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Korea National Oil www.knoc.co.kr
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North West Upgrading www.northwestupgrading.com
Nsolv www.nsolv.ca
Oak Point Energy www.oakpointenergy.ca
Occidental Petroleum www.oxy.com
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PetroChina www.petrochina.com.cn/ptr
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Shell Canada www.shell.ca
Sinopec www.sinopecgroup.com/group/en
Statoil Canada www.statoil.com
Suncor Energy www.suncor.com
Sunshine Oilsands www.sunshineoilsands.com
Syncrude www.syncrude.ca
Teck Resources www.teck.com
Total E&P Canada www.total-ep-canada.com
Touchstone Exploration www.touchstoneexploration.com
Value Creation Group www.vctek.com

ASSOCIATIONS/ORGANIZATIONS

Alberta Chamber of Resources www.acr-alberta.com
Alberta Chambers of Commerce www.abchamber.ca
Alberta Energy www.energy.gov.ab.ca
Alberta Energy Regulator www.aer.ca
Alberta Environment and Parks www.aep.alberta.ca
Alberta Innovates www.albertainnovates.ca
Alberta Innovation and Advanced Education www.eae.alberta.ca
Alberta's Industrial Heartland Association www.industrialheartland.com
Building Trades of Alberta www.bta.ca
Canada's Oil Sands Innovation Alliance www.cosia.ca
Canadian Association of Geophysical Contractors www.cagc.ca
Canadian Association of Petroleum Producers www.capp.ca
Canadian Heavy Oil Association www.choa.ab.ca
In Situ Oil Sands Alliance www.iosa.ca
Lakeland Industry & Community Association www.lica.ca
Natural Resources Conservation Board www.nrcb.ca
Oil Sands Community Alliance www.oscaalberta.ca
Oil Sands Secretariat www.energy.alberta.ca
Petroleum Technology Alliance Canada www.ptac.org

FOR MORE INFORMATION, PLEASE VISIT US AT
www.albertacanada.com

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www.albertacanada.com/business/statistics/oil-sands-quarterly.aspx